## REMARKS

Claims 1-20 are pending in the application and have been examined. The present office action is addressed as follows.

Claims 1-6, 14, 16, and 17 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Schilling et al. (U.S. Patent No. 3,952,939). Applicants traverse the rejection because Schilling fails to disclose providing wafers to be bonded.

Schilling is directed to a sheet cladding method, and discloses metallurgically bonding a protective sheet cladding to a convex-concave substrate. However, Schilling is silent regarding the joining of semiconductor wafers, as disclosed in the present specification and recited in claims 1 and 19. Accordingly, Schilling does not address the difficulties involved in bonding semiconductor wafers.

Moreover, the diffusion bonding process disclosed in Schilling relies upon an at least partial collapse of a deformable container containing the substrate, the cladding material, and a pressure transmitting medium, such as glass. When heated the glass beads become viscous, and the subsequent volume change causes the deformable container to partially collapse around the cladding and substrate. Thus, Schilling relies on glass to provide pressure to the substrate and cladding, and does not solely use isostatic pressure as claimed in claim 1. Thus, for at least the above reasons, applicants request withdrawal of the rejection.

Claims 1-20 Stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bhat et al. (U.S. Patent No. 5,207,864) in view of Benavides et al. (U.S. Patent No.

6,443,179) and/or Curbishley et al. (U.S. Patent No. 4,587,700), and further in view of Applicants' Admitted Prior Art (hereinafter, "AAPA"). Applicants traverse this.

Bhat discloses that, together with pressure, temperatures in the range of 600°C to 850°C may be applied to two wafers to join them. However, as noted by the examiner, Bhat fails to disclose that isostatic pressure is applied to the wafers. Instead, Bhat discloses that a molybdenum weight is placed on top of the pair of wafers to assure close contact. Bhat is the only one of the references that considers the problem of bonding wafers, and Bhat requires the weight to accomplish the wafer bonding.

Benavides and Curbishley offer no teachings whatsoever that concern the semiconductor industry or the difficulty in bonding semiconductor wafers that Bhat addresses, and artisans would not look to these reference to modify the processes disclosed in Bhat. Benavides is drawn to packaging of electro-microfluidic devices, and Curbishley is directed to a method for manufacturing a dual alloy cooled turbine wheel. Because both Benavides and Curbishley describe art that is so drastically different from the semiconductor field, one of ordinary skill in the art would not have looked to these references for any known solutions to any known problems in Bhat. Accordingly, it would not have been obvious to one of ordinary skill in the art to combine Bhat with Benavides and/or Curbishley.

Also, these two references fail to teach how to modify Bhat's processes. In Bhat, a 1cm×1cm InP die is placed in an organo-metallic chemical vapor deposition (OMCVD) reactor, atop a graphite susceptor, and a GaAs wafer that is approximately the

same size as the InP die is place in the reactor on top of the the die (See Bhat col. 3, lns. 28-36). To assure close contact between the InP die and the GaAs wafer, a molybdenum weight with a 5cm diameter is placed on top of the wafer (col. 3, lns. 43-45). Then RF power is applied to the graphite susceptor, raising the temperature to 650°C (col. 3, lns. 48-50). After 30 minutes under these conditions, fusion of the InP die and the GaAs wafer is complete (col. 3, lns. 50-52). As discussed in the present specification, the size of the weight limits the size of the wafers that can be fused, because if the weight has an area that is smaller than that of the wafer, the pressure applied to the wafer will not be uniform, which can cause bonding failure (See Present Specification, p. 3, lns. 11-14).

In contrast, Curbishley discloses that a hollow cylinder is cast from a first alloy (See Curbishley, col. 3, lns. 44-47). Following that, a preformed cylinder of a second alloy is inserted into the bore of the first cylinder (col. 3, lns. 59-68). Then the assembly is processed using a hot isostatic press method to bond the preformed cylinder and the cast cylinder (col. 4, lns. 27-28). During the hot isostatic pressing, the cylinder assembly is subjected to temperatures in the range of 2200°F (1204.44°C) for 4 hours (col. 4, lns. 29-32). Thus, Curbishley discloses bonding at a temperature far higher than that used in Bhat, and for a much longer period of time. Additionally, the bonding of cylinders is unlike bonding of wafers in any form. Accordingly, it is unclear how this method could be used to modify the process disclose in Bhat.

Moreover, Benavides teaches that a ceramic material may be formed using a cold isostatic pressing method followed by a hot isostatic pressing method (See

Benavides col. 8, line 65 – col. 9, line 2). That is, Benavides teaches that hot isostatic pressing is part of a method used to form ceramics, as an alternative to machining, slip casting, or rapid forging, and not as a method of bonding wafers (col. 8, line 65 – col. 9, line 6). Benavides is silent regarding the use of hot isostatic pressing for bonding of anything other than ceramics (See col. 8, line 65 – col. 9, line 1). Accordingly, it is unclear how a portion of a method for forming ceramics as taught by Benavides could be used to modify the bonding method disclosed by Bhat.

With respect to claim 4, the examiner states that Bhat discloses a process to improve bonding, which implicitly means to strengthen bonding. However, Bhat does not appear to disclose creating a temperature ramp and a pressure ramp, as recited in the claim. Bhat merely discloses that a 200g weight is placed on top of the wafers to be bonded to assure close contact between the wafers, and that the temperature is raised to 650°C. However, there is no teaching of creation of either a temperature ramp or a pressure ramp in Bhat. For this additional reason, applicants request withdrawal of the rejection of claim 4.

Moreover, regarding claim 17, the examiner asserts that the abstract of Bhat discloses that steps of applying, heating, and controlling and maintaining are carried out with a plurality of weakly bonded pairs of wafers simultaneously. However, this is not the case. While Bhat does refer to plural wafers, the reference is silent regarding plural wafer pairs. Moreover, Bhat discloses that if one of the wafers is silicon, the pair of wafers is assembled in hydrofluoric acid, and then the assembly is placed in a furnace,

which makes the use of plural pairs of wafers highly impractical or infeasible in Bhat. Applicants note that Bhat references only a single assembly. For this reason, applicants again request withdrawal of the rejection of claim 17.

For all of the foregoing reasons, applicants submit that this Application is in condition for allowance, which is respectfully requested. The Examiner is invited to contact the undersigned attorney if an interview would expedite prosecution.

Respectfully submitted,

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